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Application No. 10/054,150

AMENDMENTS TO THE CLAIMS

1-89. (Canceled)

90. (Currently Amended) A method for receiving high frequency signals, comprising:  
transmitting a coherent beam comprising at least one signal including first and second data modulated onto the beam from a laser transmitter through atmospheric turbulence to a receiver, wherein a diameter of the beam comprising said at least one signal is less than an inner scale of an atmosphere at an aperture of said transmitter, wherein a divergence angle of the beam is selected so that it exceeds a determined turbulence induced beam deviation so that a far-field footprint of the beam remains on the receiver aperture despite the atmospheric turbulence, wherein the receiver is located at a distance from the transmitter, wherein the at least one signal, after transmission through the atmospheric turbulence, has a distorted wave-front, wherein said transmitting of said first and second data is conducted at a rate greater than one gigabit/second, and wherein each of said first and second data is associated with first and second wavelength channels, respectively, the first wavelength channel being different from the second wavelength channel;

receiving said at least one distorted signal including said first and second data at a detector assembly associated with said receiver;

detecting said first data using a first detector unit of the detector assembly, wherein the first detector unit is located at a first position; and

detecting said second data using a second detector unit of the detector assembly, wherein the second detector unit is located at a second position that is different from said first position.

91. (Previously Presented) A method, as claimed in Claim 90, wherein:  
said detecting first data step includes detecting at the same time, using said first detector unit, all of said first data that was received by said first position of said detector assembly at a particular instance in time.

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92. (Previously Presented) A method, as claimed in Claim 90, wherein:  
said detecting first data step includes accepting a focal spot size diameter of greater than 40 microns and then reducing said focal spot size diameter.
93. (Previously Presented) A method, as claimed in Claim 92, wherein:  
said reducing step includes using a focusing element having a refractive index greater than 2.
94. (Previously Presented) A method, as claimed in Claim 93, wherein:  
said focusing element has a traverse length along and through which said first data having said associated first wavelength channel passes, and the speed of said first data in passing along and through said traverse length is no greater than 30% of the speed of light in air.
95. (Previously Presented) A method, as claimed in Claim 92, wherein:  
said focal spot size diameter is greater than about 100 microns.
96. (Previously Presented) A method, as claimed in Claim 90, wherein:  
said detector assembly includes a linking device, a focusing element and a detector unit.
97. (Previously Presented) A method, as claimed in Claim 90, further comprising after the transmitting step:  
finitely focusing, with a holographic unit, said first data to form a first beam and second data to form a second beam.
98. (Previously Presented) A method, as claimed in Claim 90, wherein:  
said detecting first data step includes reflecting said first data associated with said first wavelength channel by a first mirror to a focusing element and with an output of said focusing element being in communication with said first detector unit.

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99. (Previously Presented) A method, as claimed in Claim 90, wherein in said receiving step said first data is finitely focused on a first focal point and said second data is finitely focused on a second focal point and the first points is at least substantially at the first location and the second focal point is at least substantially at the second location.

100. (Previously Presented) A method, as claimed in Claim 90, wherein:  
said detecting said second data step includes accepting said second data using a linking device, directing said second data to a second focusing element and with the output of said second focusing element being in communication with said second detector unit.

101. (Currently Amended) An apparatus for receiving high frequency first data associated with a first wavelength and high frequency second data associated with a second wavelength, comprising:

a holographic unit that receives said first and second data; and  
a detector assembly responsive to said holographic unit for detecting said first and second data, said detector assembly including:

a first detector unit and a first focusing element having a refractive index that reduces a focal spot size associated with said first data, wherein the first focusing element is in direct physical contact with the first detector unit; and

a second detector unit and a second focusing element having a refractive index that reduces a focal spot size associated with said second data, wherein the second focusing element is in direct physical contact with the second detector unit.

102. (Previously Presented) An apparatus, as claimed in Claim 101, wherein:  
said refractive index is greater than 2 and said focusing element reduces said focal spot size from a focal spot size diameter of greater than 100 microns to a focal spot size diameter of less than 50 microns.

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103. (Previously Presented) An apparatus, as claimed in Claim 101, wherein:  
said detector assembly includes a linking device and a detector unit and with said focusing element being disposed between said linking device and said detector unit, with said focusing element receiving an input from said linking device and providing an output to said detector unit.
104. (Previously Presented) An apparatus, as claimed in Claim 101, wherein:  
said detector assembly includes a detector unit positioned at a distance from a focal area provided by said holographic unit and being associated with said data having said first wavelength.
105. (Previously Presented) An apparatus, as claimed in Claim 101, wherein:  
said data comprises first and second data and said detector assembly includes a sorter block for accepting said data and for providing a first communication path for said first data and a spatially offset second communication path for said second data.
106. (Previously Presented) An apparatus, as claimed in Claim 101, wherein:  
said detector assembly includes a linking device that accepts said first data associated with a focal spot size greater than 50 microns.
107. (Previously Presented) An apparatus, as claimed in Claim 101, wherein:  
said linking device includes a pick-off mirror, with said pick-off mirror being able to properly reflect a focal spot size greater than 200 microns.
108. (Previously Presented) An apparatus, as claimed in Claim 101, wherein:  
said holographic unit includes at least one of the following: a volume hologram, and a holographic mirror.

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109. (Currently Amended) A system for receiving high frequency signals, comprising:  
a receiver that receives at least one signal including first and second data and comprises a detector assembly; and

a transmitter that transmits the at least one signal as a beam having a diameter that is less than an inner scale of an atmosphere at or near a transmitter aperture through atmospheric turbulence to the receiver, wherein the receiver is located at a distance of greater than 100m from the transmitter, wherein the atmospheric turbulence is determined to be associated with a worst case atmospheric turbulence induced deviation of the beam, wherein a divergence angle of the beam is selected to exceed the atmospheric turbulence induced beam deviation for the beam under the determined worst case conditions, wherein the at least one signal, after transmission through the atmospheric turbulence, has a distorted wavefront, wherein said first and second data are each transmitted at a rate greater than one gigabit/second, wherein said first and second data are respectively associated with first and second wavelength channels, the first wavelength channel being different from the second wavelength channel, and wherein the detector assembly comprises at least a first detector unit located at a first position for detecting said first data, and a second detector unit located at a second position for detecting the second data, the second position being different from said first position.

110. (Previously Presented) A system, as claimed in Claim 109, wherein:  
said detector assembly includes a first focusing element that finitely focuses the first data onto the first detector unit, wherein a focal spot size of the first data has a diameter of greater than 40 microns.

111. (Previously Presented) A system, as claimed in Claim 110, wherein:  
said focusing element has a refractive index greater than 2.

112. (Previously Presented) A system, as claimed in Claim 111, wherein:

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said focusing element has a traverse length along and through which said first data having said associated first wavelength channel passes, and the speed of said first data in passing along and through said traverse length is no greater than 30% of the speed of light in air.

113. (Previously Presented) A system, as claimed in Claim 111, wherein:  
said focal spot size diameter is greater than about 100 microns.

114. (Previously Presented) A system, as claimed in Claim 109, wherein:  
said detector assembly includes a linking device, a focusing element and a detector unit.

115. (Previously Presented) A system, as claimed in Claim 109, further comprising:  
a holographic unit that finitely focuses said first and second data in said at least one distorted signal at the first and second locations.

116. (Previously Presented) A system, as claimed in Claim 110, wherein the detector assembly comprises:  
a first mirror that reflects said first data associated with said first wavelength channel onto the focusing element.

117. (Currently Amended) A method for receiving high frequency data associated with at least a first wavelength channel, comprising:

receiving at a first receiving location said first wavelength channel after the first wavelength channel has passed through atmospheric turbulence and thereby become optically distorted;

finitely focusing said received first wavelength channel with a first optical element to form a focused first beam having a focused first spot size, wherein said first focused beam is focused at a first location;

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further finitely focusing the focused first beam with a second optical element at said first location to form a further focused first beam having a further focused first spot size that is smaller than the focused first spot size, wherein the first and second optical elements are at different spatial locations;

detecting at least a portion of the data in the further focused first beam;

receiving at said first receiving location a second wave length channel after the second wave length channel has passed through atmospheric turbulence and thereby become optically distorted, wherein said first and second wavelength channels are transmitted as part of a first beam;

finitely focusing said received second wavelength channel with said first optical element to form a focused second beam having a focused second spot size, wherein said second focus beam is focused at a second location;

further finitely focusing the focused second beam with a third optical element at said second location to form a further focused second beam having a further focused second spot size that is smaller than the focused second spot size, wherein the first and third optical elements are at different spacial locations;

detecting at least a portion of the data in the further focused second beam.

118. (Previously Presented) A method, as claimed in Claim 117, wherein the first optical element is a holographic unit.

119. (Previously Presented) A method, as claimed in Claim 117, wherein the second optical element is a focusing element having a refractive index greater than 2.

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121. (Previously Presented) A method, as claimed in Claim 117, wherein:

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said second focusing element reduces said focal spot size from a focal spot size diameter of greater than 100 microns to a focal spot size diameter of less than 50 microns.

122. (Previously Presented) A method, as claimed in Claim 118, wherein:  
said holographic unit includes at least one of the following: a volume hologram and a holographic mirror.

123. (Previously Presented) A method, as claimed in Claim 90, wherein said transmitting step includes:  
modulating said first and second data on a respective light beam to form first and second modulated light beams, respectively, and further comprising:  
demodulating the detected first and second data.

124. (Previously Presented) A method, as claimed in Claim 96, wherein a first linking device corresponds to the first detector and a second linking device corresponds to the second detector, wherein the first and second linking devices are in different spatial locations, wherein the first data detecting step comprises:

redirecting, with the first linking device, said first data from a first optical path to a transversely oriented second optical path, the second optical path intersecting the first detector unit; and

wherein said second data detecting step comprises:

redirecting, with the second linking device, said second data from a third optical path to a transversely oriented fourth optical path, the fourth optical path intersecting the second detector unit.

125. (Previously Presented) A method, as claimed in Claim 90, wherein a spacing between said first and second wavelength channels is about 4 nanometers.



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126. (Previously Presented) An apparatus, as claimed in Claim 101, wherein the linking device is located at a distance from the detector unit and is configured to redirect said data from a first optical path to a transversely oriented second optical path.